



# TECHNICAL REPORT



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## High-voltage direct current (HVDC) systems – Guidance to the specification and design evaluation of AC filters – Part 2: Performance

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

ICS 29.200

ISBN 978-2-8322-3540-9

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## CONTENTS

FOREWORD .....	5
INTRODUCTION .....	7
1 Scope .....	8
2 Normative references .....	8
3 Current-based interference criteria .....	8
3.1 General .....	8
3.2 Determining the necessity for telephone interference limits .....	9
3.3 Defining telephone interference limits .....	11
3.3.1 General .....	11
3.3.2 Mechanisms of interference .....	11
3.3.3 Noise performance coordination levels .....	13
3.3.4 Influence of power transmission lines .....	14
3.3.5 Determination of IT limits for a specific project .....	19
3.3.6 Pre-existing harmonics and future growth .....	23
3.3.7 Recommendations for technical specifications .....	25
3.4 Consequences for filter design .....	26
3.5 Telephone infrastructure mitigation options .....	27
3.6 Experience and examples .....	28
3.6.1 General .....	28
3.6.2 Review of design requirements .....	28
3.6.3 Measured current levels of schemes in service .....	30
3.6.4 Example of actual telephone interference problems .....	31
3.6.5 Experience in China, showing no interference problems .....	33
3.7 Conclusions .....	33
4 Field measurements and verification .....	34
4.1 Overview .....	34
4.2 Equipment and subsystem tests .....	34
4.2.1 General .....	34
4.2.2 Fundamental frequency impedance and unbalance measurement .....	34
4.2.3 Frequency response curve .....	34
4.3 System tests .....	35
4.4 Measuring equipment .....	35
4.4.1 Overview .....	35
4.4.2 AC filter energization .....	36
4.4.3 Verification of the reactive power controller .....	36
4.4.4 Verification of the specified reactive power interchange .....	36
4.4.5 Verification of the harmonic performance .....	37
4.4.6 Verification of audible noise .....	39
4.5 In-service measurements .....	41
4.5.1 General .....	41
4.5.2 In-service tuning checks .....	41
4.5.3 On-line monitoring of tuning .....	41
4.5.4 Monitoring of IT performance .....	41
4.5.5 Measurements of pre-existing harmonic levels for design purposes .....	41
Annex A (informative) Voltage and current distortion – Telephone interference .....	42
A.1 Voltage distortion limits for HV and EHV networks .....	42

A.1.1	General .....	42
A.1.2	Recommended limits for HV or EHV networks .....	43
A.2	Harmonic current in generators .....	45
A.3	Causes of telephone interference .....	45
A.4	Definition of telephone interference parameters.....	47
A.5	Discussion .....	50
A.6	Coupling mechanism from power-line current to telephone disturbance voltage.....	51
Annex B (informative)	Example of induced noise calculation with Dubanton equations.....	52
B.1	General .....	52
B.2	Residual IT .....	52
B.3	Balanced IT .....	53
Annex C (informative)	Illustration of the benefit of including a TIF requirement in the technical specification.....	54
Annex D (informative)	Specification of IT limits dependent on network impedance .....	56
Annex E (informative)	The impact of AC network harmonic impedance and voltage level on the filter design necessary to fulfil an IT criterion.....	60
E.1	General .....	60
E.2	Assumptions and pre-conditions.....	61
E.3	Harmonic impedance of AC network.....	63
E.4	Filter design.....	65
E.5	Explanation of the difference in impact of relative and absolute performance criteria on required filter Mvar .....	67
Bibliography	.....	68
Figure 1	– Conversion factor from positive sequence current at the sending end to positive sequence current at the receiving end, and input impedance of a 230 kV line, 124 km long, 1000 $\Omega$ -m.....	21
Figure 2	– Conversion factor from positive sequence current to residual current, and input impedance of a 230 kV line, 124 km long, 1 000 $\Omega$ -m.....	21
Figure 3	– Simple circuit for calculation of harmonic performance taking into account pre-existing harmonics.....	23
Figure 4	– Converter variables for harmonic performance tests .....	37
Figure 5	– Example of measurements made during a ramp of the converters.....	40
Figure A.1	– Contributions of harmonic voltages at different voltage levels in a simple network .....	42
Figure A.2	– C-message and psophometric weighting factors .....	46
Figure A.3	– Flow-chart describing the basic telephone interference mechanism .....	51
Figure D.1	– Simplification of the detailed network used for telephone interference simulation.....	56
Figure D.2	– Induced voltage in telephone circuit vs. network impedance, for unitary current injected.....	57
Figure D.3	– IT limits as defined for different network impedances .....	58
Figure E.1	– Converter harmonics un-weighted (A) and IT weighted (kA) on 240 kV base.....	62
Figure E.2	– Converter Mvar absorption versus load .....	63
Figure E.3	– Impedance sector diagram and RL-equivalent circuit.....	64
Figure E.4	– Simplified converter/system topology .....	64
Figure E.5	– Simplified circuit including overhead transmission line.....	65

Table 1 – Performance thresholds for metallic noise .....	14
Table 2 – Performance thresholds for longitudinal noise.....	14
Table 3 – Performance thresholds for balance .....	14
Table 4 – Illustrative maximum telephone line length to achieve the North American recommended longitudinal $N_g$ level, as a function of balanced IT level, earth resistivity and separation distance .....	17
Table 5 – Illustrative maximum telephone line length to achieve the North American recommended longitudinal $N_g$ level as a function of residual IT level, earth resistivity and separation distance.....	18
Table 6 – Some HVDC schemes – Specified telephone interference criteria .....	29
Table 7 – Measured 95 % values of THFF and $I_{pe}$ of a 600 MW scheme (3 phases).....	31
Table 8 – Measured 95 % values of THFF and $I_{pe}$ of a 300 MW scheme (3 phases).....	31
Table A.1 – Voltage distortion limits from IEEE 519-1992 .....	43
Table A.2 – Compatibility levels for harmonic voltages (in percent of the nominal voltage) in LV and MV power systems [based on Table 1 of IEC TR 61000-3-6:2008] .....	44
Table A.3 – Indicative values of planning levels for harmonic voltages in HV and EHV power systems [based on Table 2 of IEC TR 61000-3-6:2008].....	44
Table E.1 – Required total amount of installed filter Mvars to meet a IT limit of 25 kA for 600 MW transmission .....	61

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

# HIGH-VOLTAGE DIRECT CURRENT (HVDC) SYSTEMS – GUIDANCE TO THE SPECIFICATION AND DESIGN EVALUATION OF AC FILTERS –

## Part 2: Performance

### FOREWORD

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The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a Technical Report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 62001-2, which is a Technical Report, has been prepared by subcommittee 22F: Power electronics for electrical transmission and distribution systems, of IEC technical committee 22: Power electronic systems and equipment.

This first edition of IEC TR 62001-2, together with IEC TR 62001-1, IEC TR 62001-3 and IEC TR 62001-4, cancels and replaces IEC TR 62001 published in 2009. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC TR 62001:

- a) expanded and supplemented Clause 19, and Annex B;
- b) new Clause 3 on current-based interference criteria;
- c) new annexes on induced noise calculation with Dubanton equations;
- d) addition of a TIF requirement in a technical specification,
- e) specification of IT limits dependent on network impedance and on the impact of AC network harmonic impedance; and
- f) specification of voltage level on the filter design necessary to fulfil an IT criterion.

The text of this Technical Report is based on the following documents:

Enquiry draft	Report on voting
22F/410/DTR	22F/414/RVC

Full information on the voting for the approval of this document can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62001 series, published under the general title *High-voltage direct current (HVDC) systems – Guidance to the specification and design evaluation of AC filters*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## INTRODUCTION

The IEC 62001 series is structured in four parts:

### Part 1 – Overview

This part concerns specifications of AC filters for high-voltage direct current (HVDC) systems with line-commutated converters, permissible distortion limits, harmonic generation, filter arrangements, filter performance calculation, filter switching and reactive power management and customer specified parameters and requirements.

### Part 2 – Performance

This part deals with current-based interference criteria, design issues and special applications, field measurements and verification.

### Part 3 – Modelling

This part addresses the harmonic interaction across converters, pre-existing harmonics, AC network impedance modelling, simulation of AC filter performance.

### Part 4 – Equipment

This part concerns steady-state and transient ratings of AC filters and their components, power losses, audible noise, design issues and special applications, filter protection, audible noise, seismic requirements, equipment design and test parameters.

# HIGH-VOLTAGE DIRECT CURRENT (HVDC) SYSTEMS – GUIDANCE TO THE SPECIFICATION AND DESIGN EVALUATION OF AC FILTERS –

## Part 2: Performance

### 1 Scope

This part of IEC 62001, which is a Technical Report, provides guidance on the performance aspects and verification of performance of harmonic filters.

The scope of this document covers AC side filtering for the frequency range of interest in terms of harmonic distortion and audible frequency disturbances. It excludes filters designed to be effective in the PLC and radio interference spectra.

This document concerns the "conventional" AC filter technology and line-commutated high-voltage direct current (HVDC) converters.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC TR 62001-1:2016, *High-voltage direct current (HVDC) systems – Guidebook to the specification and design evaluation of AC filters – Part 1: Overview*

IEC TR 62001-4:2016, *High-voltage direct current (HVDC) systems – Guidebook to the specification and design evaluation of AC filters – Part 4: Equipment*